

# Systematic Reviews: A Complex Search Episode for Evidence Based Policy and Practice

Sarvnaz Karimi & Falk Scholer

National ICT Australia RMIT University



A long term smoker with **chronic obstructive airways disease (COPD)** who has recently quit smoking has breathing difficulties. What are the suitable **non-drug therapies** to improve the patient's breathing?

(example by Prof. Paul Glasziou)



**Is adjunctive vitamin A effective in children diagnosed with non-measles pneumonia?**

(Cochrane collaboration)



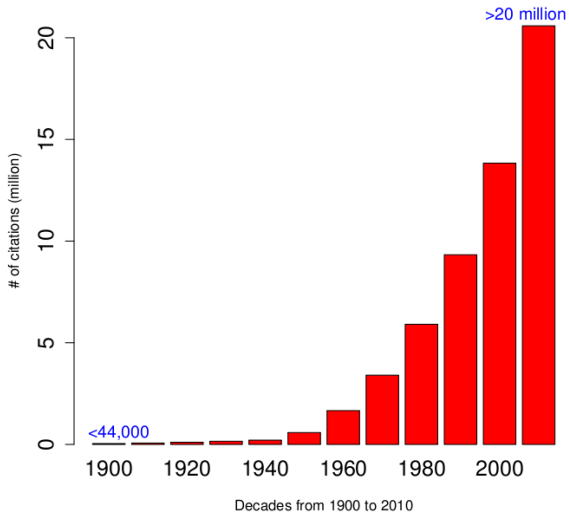
# A clinician applying research to practice needs to know:

**What?** interventions match the patient's conditions

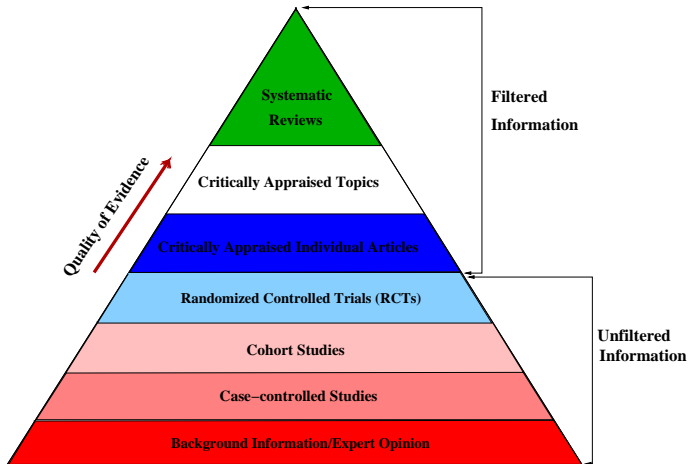
**What?** quality of evidence and applicability

**What?** duration, dosage, ...

# Growth of medical scientific literature archive (MEDLINE)



# Evidence-Based Medicine (EBM)



EBM applies the best available evidence to clinical decision-making.

# A sample systematic review

**Title:** Vitamin A for non-measles pneumonia in children

**Main question:** Is adjunctive vitamin A effective in children diagnosed with non-measles pneumonia?

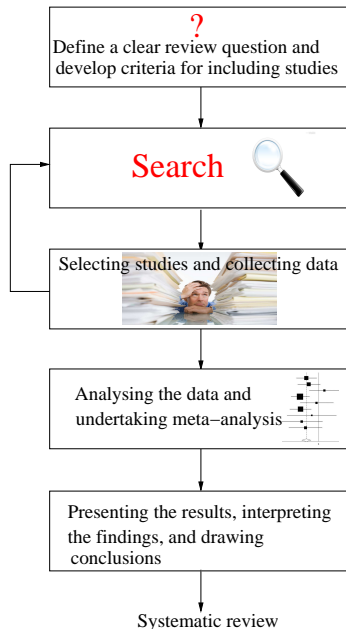
**Inclusion criteria:** Only parallel-arm, randomized controlled trials (RCTs) and quasi-RCTs, in which children (younger than 15 years of age) with non-measles pneumonia were treated with adjunctive vitamin A, were included...

**Methods:** We searched The Cochrane Library, Cochrane Central Register of Controlled Trials (CENTRAL 2010, issue 3) which contains the Acute Respiratory Infections Group's Specialised ...

**Main results:** Six trials involving 1740 children were included. There was no significant reduction in mortality...

The screenshot shows the Cochrane Library interface. At the top, it says 'THE COCHRANE LIBRARY' with the tagline 'Independent high-quality evidence for health care decision making'. Below this is a search bar with the text 'Enter search term' and a dropdown menu set to 'Title, Abstract or Keyword'. The main content area is titled 'Vitamin A for non-measles pneumonia in children' and lists authors: 'Taining Wu<sup>1</sup>, Juan Tu<sup>2</sup>, Juhui Wu<sup>2</sup>'. It includes contact information for the authors and the editorial group, 'Cochrane Acute Respiratory Infections Group'. The page also features a table of contents with links to PDF, Summary, Standard, Full, Abstract, Plain language summary, Quick links, What's new, The review, Background, Objectives, Methods, Results, Discussion, Authors' conclusions, Acknowledgements, and References.

# Systematic reviewing process





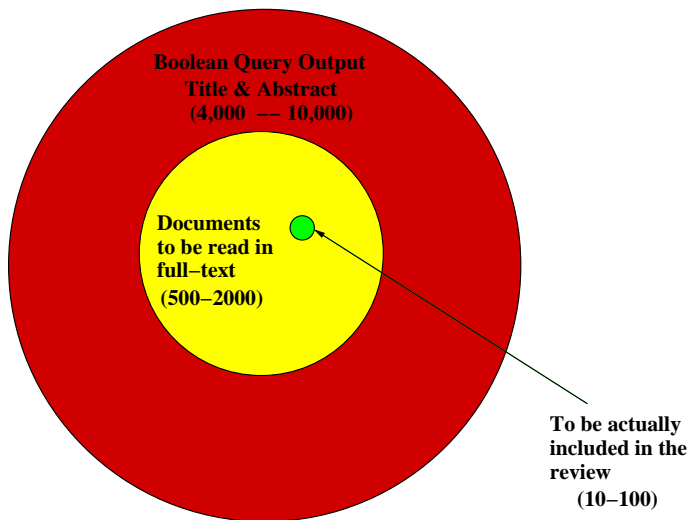
## A sample MEDLINE query

1. exp vitamin A/
2. vitamin A.mp
3. retinol.mp
4. exp dietary supplements/
5. or/1-4
6. exp pneumonia/
7. pneumonia\$.mp
8. exp pneumonia, bacterial/
9. exp pneumonia, lipid/
10. exp pneumonia, mycoplasma/
- ...
14. exp pneumonia, viral/
15. exp respiratory tract infections/
16. acute adj respiratory.mp
17. respiratory adj infection.mp
18. respiratory adj disease.mp
19. or/6-18
20. 5 and 19

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# Scale of evidence inclusion



# Where can we help?

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Our contributions on introducing ranked retrieval is published in:

\* S. Karimi, S. Pohl, F. Scholer, L. Cavedon, J. Zobel, Boolean versus Ranked Querying for Biomedical Systematic Reviews, BMC Medical Informatics and Decision Making, Vol 10, Number 58, 2010

\* D. Martinez, S. Karimi, L. Cavedon, T. Baldwin, Facilitating Biomedical Systematic Reviews Using Ranked Text Retrieval and Classification, ADCS 2008, December 2008

# To assist in query formulation for an initial search strategy

- Suggesting key-terms and synonyms e.g neoplasm for cancer
- Bag-of-words to Boolean Suggesting structure to specified query terms. Template queries already exist for limited inclusion criteria.

<input type="checkbox"/>	☆ antibiotics for pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ symptoms for pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ viral pneumonia contagious	<input type="checkbox"/>
<input type="checkbox"/>	☆ chronic pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ bronchitis vs pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ symptom of pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ staph pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ pneumonia facts	<input type="checkbox"/>
<input type="checkbox"/>	☆ pneumonia and pregnancy	<input type="checkbox"/>
<input type="checkbox"/>	☆ pneumonia symptoms	<input type="checkbox"/>
<input type="checkbox"/>	☆ a typical pneumonia	<input type="checkbox"/>
<input type="checkbox"/>	☆ buy vitamin a	<input type="checkbox"/>



# Consistency verification

- Automatic verification against inclusion criteria



- Automatic self-consistency verification: If a reviewer selects one document, but later chooses to ignore a similar one, the system should **flag this possible inconsistency**.



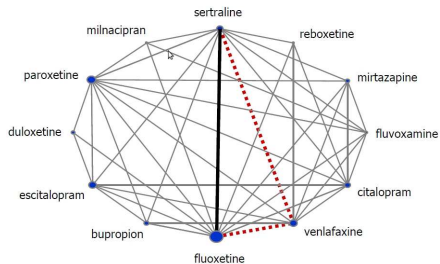
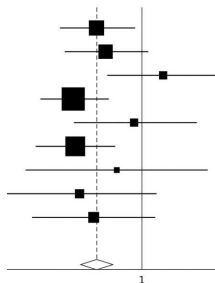
# Dynamic relevance feedback

- Document selection process is currently paper-based.
- A dynamic relevance feedback approach that is active during the document selection process could **rank** the remaining documents based on **estimated importance**.
- Dynamic relevance feedback might identify **additional documents** that exist in the collection but were missed by the initial search strategy.



# Analysis and Meta-Analysis

There are tools that assist analysing already extracted **numerical data** from one or multiple studies, but the input to these tools should first be extracted manually from text. Automatic **information extraction** can save hours.





# Review Update

Updating the review with new evidence so that it remains relevant.



Treatment X works.  
Year 2005

Treatment Y is preferred over X.  
Year 2010

# Literature survey is hard!



Thanks!